

obtained by a projection from the pendulum of the clock eclipsing a white line on the lower extremity of the large pendulum at the moment the two pendulums passed the vertical together. This coincidence was observed by means of a telescope. The distance of the clock from the pendulum was about eight feet, and the points of the pendulums were rendered visible together in the focus of the telescope by means of an intervening lens. A standard barometer and thermometer were suspended close to the pendulum and were constantly referred to during every series of observations.

The scale of comparison was finally compared with the ten feet standard bar of the Colony in the Crown Lands Department by the Government Astronomer. In conclusion, Professor Neumayer stated that his speedy departure for Europe would render it impossible to make public the final results until after his arrival there.

ART. XXV.—*Further Notes on the Coast and Lakes of Gipps Land, with sketch plan, being supplementary to report on the Lakes Entrance.*

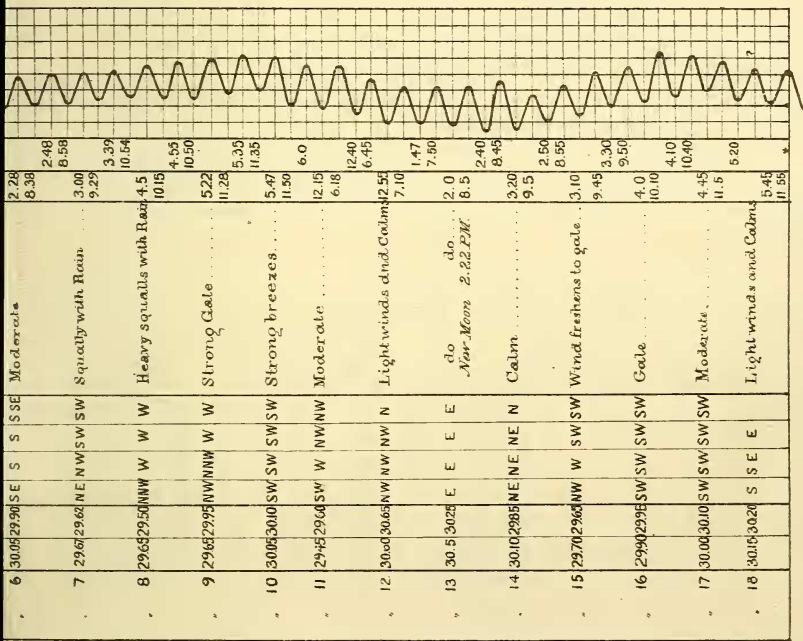
By THOMAS E. RAWLINSON, ESQ., C.E.

[Read 29th June, 1863.]

1. Having late in the month of July last, received instructions to proceed to the entrance of the Gipps Land Lakes, to make a survey of the same for public purposes, I have been enabled to obtain certain data, which I now purpose laying before the members of the Society.

2. In my report of February last, on the lake entrance, which I was permitted to bring before the Society, I gave a general description of the physical features of the coast line, and of the chief lakes and rivers debouching into them, with such remarks and inferential reasoning on the same as my then means permitted.

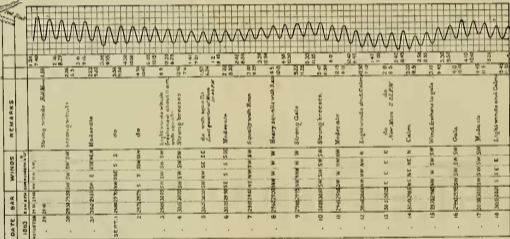
3. Since the date of writing the report above alluded to, great changes have taken place at the entrance, owing chiefly to the great and continuous drought of last summer having reduced the outflow of waters from the lakes, which, combined with the action of the tides and of certain winds on the sands of the coast, so far blocked up the old entrance that it could be crossed on foot. These droughts were followed by unusual floods, the waters of which obtained



2.28	2.48	3.00	3.39	4.55	5.22	5.35	6.0	6.45	7.00	7.50	8.5	8.45	9.5	10.10	11.5	11.55
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Sketch Plan of Entrance
TO THE GIPPSLAND LAKES AND TIDAL DIAGRAM
TO ACCOMPANY M^r RAWLINGS'S PAPER



vent by re-opening the old, and bursting through a new channel, about one third of a mile south-west of the old entrance, across the narrow spit of land which divides Reeves River from the sea. The subsequent persistent floods have kept both channels more or less open up to this time, but indications have for some time back been presented of the probable blocking up of the channel of the river connecting the two entrances, and also of the old entrance channel.

4. By reference to the accompanying plan, it will be seen that the Reeves River is divided from the sea throughout its length, by only a narrow strip of land, which, for a distance of upwards of a mile south of the last formed entrance, and rather more than two miles south-west of the high land, running inland from the bluff, at the north-east side of the entrance, consists of a low sand spit almost wholly without vegetation, and nowhere exceeding 500 feet in width, and rarely exceeding five feet in height above the surface of the tide waters; in most instances however it is much narrower and lower.

5. Further to the south-west the dividing land rises into sand dunes, varying in height and width, and covered to a greater or less extent with the vegetation common to the coast.

6. The lately formed entrance occupies nearly the same position on the coast as the one in existence seven years ago. During the above period the entrance gradually wore its way in the direction of the high bluff lands to the north-east, until it reached its present site, known as the old entrance.

7. The gradual shifting of the entrance, as above stated, during the past seven years is, in my opinion, tolerably conclusive evidence of the existence of sand throughout the whole area of the sand spit between the two entrances, to a depth equal at least to that of the waters in the entrances, and may, I think, be also acceptable as evidence of the probable minimum depth of the sands forming the divide between the lake and river waters and the sea.

8. An attempt was made, during my last visit, to ascertain the depth of the sands by boring within certain limits, but, after reaching the level of the surrounding waters, the sand became so quick that our imperfect apparatus was insufficient to lift the materials, or deepen the bore hole.

9. Owing to the recent visit of the Geological Surveyor to this locality, I will not do more than very briefly allude to

the general nature of the two more prominent features of the locality, namely, "Brait-putta," known as "Jimmy's Point," and the "Bluff"

10. "Brait-putta" rises to about 150 feet, and is a mere extension of the high coast land seawards, so that from the sea it is soon merged in the dark back-ground of timbered lands behind. Brait-putta is a laminated sandstone rock, presenting favourable indications of being able to afford a supply of good stone, suitable for building and other purposes.

11. The "Bluff" to which so much importance has been attached hitherto, as the point where a permanent entrance could be made to and from the lakes, is a low promontory projecting but slightly from the general line of the coast, rising at the face about 50 feet, and a few yards inland to a height of about 70 feet, and thence gradually rising further to the level of the higher wooded lands behind. At a little distance out at sea it requires a bright day and a knowledge of the coast to be able to distinguish the Bluff on the general coast line.

12. The Bluff consists, for about half its height, of soft friable sandstone, alternating with thin irregular layers of hard calcareous sandstone, containing abundance of mutilated fossil shells, whilst the upper portion of the Bluff consists of marl, thickly studded with fossil shells, in various stages of decay.

13. The Bluff is liable to rapid wear, owing to the washing out of the loose sandstone below, and the consequent falling over and destruction by the sea of the harder materials from above. Evidence of such destruction exists in the reef of rocks which extends from the Bluff seawards, for a short distance.

14. Having so far endeavoured to fill up some of the outlines of my previous sketch, I will now as briefly as possible call attention to the new facts, which I deem to be of importance, as they have not been prominently observed before, that I am aware of, and because they are illustrative in a new locality of natural laws which have been pointed out elsewhere.

15. The facts to which I allude are, firstly, the existence of a powerful ocean current close in shore; and secondly, the influence of what in this place I will call atmospheric tidal influence, as distinguished from the diurnal tides, resulting from lunar and solar attractions.

16. My attention was called to the first by the remarks of a Mr. M. Campbell, who for some years back has been conversant with the coast, and who informed me of the existence of an easterly current along the shore ; but it was only upon the occasion of proceeding to obtain soundings outside the bars that I had any suspicions of its true nature, in consequence of finding blue water in nine fathoms, with a strong drift, and in seventeen fathoms, at a distance of about two miles from the shore, a great increase of colour, with soundings consisting of fine gravel and very coarse quartz sand, showing that the current was not a superficial one only. From various causes I was unable to take the velocity, but, judging from the rate of drift and the nature of the soundings, I think the current cannot be much less than two miles per hour.

17. From the strength and direction of the stream, I am induced to believe that it is part of the great polar current shown on Maury's charts, running to the north, of which, dividing against the southern extremity of Tasmania, one portion continues as a northern current up the eastern shores of Tasmania and New South Wales, to Moreton Bay, and the other, meeting the southern side of the Australian Continent,* is diverted to the eastward through Bass's Straits, and forms the current the edge of which runs along the Gipps Land shores.

18. Although there may be little doubt on this matter, it would be desirable to obtain confirmation, by floating bottles (containing memoranda of time and place of starting) in the leading currents to the westward of the Straits.

19. During the period of the recent survey of the entrance a series of bottles were properly sealed, with notes inside of the time and place where floated, and a request made that any person picking up the same would note the time and place and forward the papers contained, either to the office of Roads and Bridges, or to the Melbourne *Argus*, for publication. The last series of bottles, dated the 15th September, were intended to have been floated at two miles distance from the coast, but the threatening weather prevented this being done, and the bottles were consequently only launched in the old entrance and watched through the line of breakers into the currents beyond.

* NOTE.—Evidence has since been obtained that this is part of the easterly current setting from St. Paul's, across the Indian Ocean, past the South Coast of Australia.

20. It will be most interesting to hear again of these wanderers, as they may afford more positive data relative to the final course of this current.

21. The second point which I deem of importance, is the atmospheric tide, as contra and distinct from the diurnal tides. By a reference to the tidal diagram on the drawing, and the accompanying meteorological register, it will be seen that the ordinary lunar tides appear as mere diurnal undulations upon the surface of a greater and more general wave.

22. The origin of this larger wave, or, as I have before termed it, this "atmospheric tidal influence," was for some time a complete enigma, which I attempted to solve, by supposing the depression and elevation of the waters to be caused by winds, on or off the shore, heaping up or depressing them as the case might be ; but, although there was some show of reason for this idea, there were discrepancies which could not be fully reconciled with the theory, and I was led to consider how far the barometer readings would account for the phenomena presented.

23. After a careful analysis of the record, I believe the results justify me in regarding the readings, when taken in connection with the wind register, as sufficient to account for the apparent anomalies.

24. In the instances where the barometer readings would appear at first sight to be at fault, a reference to the wind register shows influences which modify the results but do not affect the theory, and as the wind can only be looked upon as a result or consequence of the atmospheric conditions, of which the barometer is the index, even the anomalies themselves may, in my opinion, be quoted as a confirmation of the theory advanced.

25. After reviewing the various phases of the question, I have arrived at the conclusion that the larger undulations of the ocean, as shown on the tidal diagram, are the result of the atmospheric waves indicated by the barometer, the existence of which has been hitherto suspected, but of which I am not aware that any one has had the opportunity previously of demonstrating from regular observations.

26. By reference to the register, it will be seen that, on the 28th August, with the barometer at 29.50 and north-west winds, the waters stood high ; and the subsequent fluctuations of the barometer, the winds and tide-levels are in accordance, until the maximum pressure of 30.25, shown by the barometer on the 5th September, gives the greatest